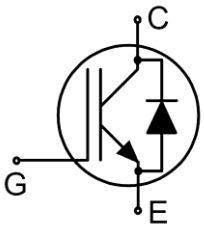
N 沟绝缘栅双极晶体管
N-CHANNEL IGBT

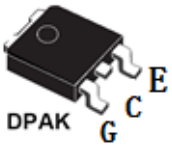
TT05N065EQ

主要参数 MAIN CHARACTERISTICS

IC	6 A
VCES	650V
Vcesat（Vge=15V）	1.6V

封装 Package





用途

- 逆变器
- UPS 电源

APPLICATIONS

- General purpose inverters
- UPS

产品特性

- 低栅极电荷
- Trench FS 技术
- 通态压降
- RoHS 产品

FEATURES

- Low gate charge
- Trench FS Technology
- Saturation voltage
- RoHS product

订货信息 ORDER MESSAGE

订 货 型 号 Order codes		印 记 Marking	封 装 Package
无卤-条管 Non halogen-Tube	无卤-编带 Non halogen-Reel		
TT05N065EQ-R-BR	TT05N065EQ-R-AR	TT05N065EQ	DPAK

绝对最大额定值 ABSOLUTE RATINGS (Tc=25℃)

项 目 Parameter	符 号 Symbol	数 值 Value	单 位 Unit
最高集电极－发射极直流电压 Collector-emitter voltage	V_{CES}	650	V
*连续集电极电流 Collector current-continuous	I_C T=25℃	12	A
	I_C T=100℃	6	A
最大脉冲集电极极电流（注 1） Collector current - pulse （note 1）	I_{CM}	20	A
最高栅极发射极电压 Gate-emitter voltage	V_{GES}	±30	V
安全工作区 Turn-off safe area	-	20	A
耗散功率 Power dissipation	P_D T_C=25℃	68.1	W
最高结温 Operating temperature range	T_J	-55～+175	℃
存储温度 Storage temperature range	T_{STG}	-55～+150	℃
引线最高焊接温度 Maximum lead temperature for soldering purposes	T_L	300	℃

*连续集电极电流由最高结温限制

*Collector current limited by maximum junction temperature

注释：

1：脉冲宽度由最高结温限制

Notes:

1：Pulse width limited by maximum junction temperature

电特性 ELECTRICAL CHARACTERISTICS

项　　目 Parameter	符　号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
关态特性 Off -Characteristics						
集电极－发射极击穿电压 Collector-emitter voltage	BV_{CES}	I_C=250μA, V_{GE}=0V	650	-	-	V
零栅压下集电极漏电流 Zero gate voltage collector current	I_{CES}	V_{CE}=650V, V_{GE}=0V, T_C=25℃	-	-	10	μA
正向栅极体漏电流 Gate-body leakage current, forward	I_{GESF}	V_{CE}=0V, V_{GE} =20V	-	-	200	nA
反向栅极体漏电流 Gate-body leakage current, reverse	I_{GESR}	V_{CE}=0V, V_{GE} =-20V	-	-	-200	nA
通态特性 On-Characteristics						
阈值电压 Gate threshold voltage	$V_{GE(th)}$	V_{CE} = V_{GE} , I_C=250μA	4.0	-	6.0	V
饱和压降 Collector-emitter saturation voltage	V_{CESAT}	VGE=15V IC=5A Tc=25℃	-	1.5	1.8	V
		VGE=15V IC=6A Tc=25℃	-	1.6	-	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{ies}	V_{CE}=25V, V_{GE}=0V, f=1.0MHz	-	259	-	pF
输出电容 Output capacitance	C_{oes}		-	31.3	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	10.3	-	pF
栅极电荷总量-Total gate charge	Qg	V_{CC}=480V, I_C=5A, V_{GE}=15 V T_C=25℃	-	13.7	-	nC
栅极-发射极电荷 Gate to emitter charge	Qge		-	2.3	-	
栅极-集电极电荷 Gate to collector charge	Qgc		-	5.8	-	
栅极电荷总量-Total gate charge	Qg	V_{CC}=480V, I_C=6A, V_{GE}=15 V T_C=25℃	-	16.8	-	nC
栅极-发射极电荷 Gate to emitter charge	Qge		-	2.8	-	
栅极-集电极电荷 Gate to collector charge	Qgc		-	6.3	-	
栅极电阻-Gate resistance	Rg	f=1 MHz, open collector	-	2.0	-	Ω
短路电流-Short current	Isc	V_{GE}=15V V_{CE}=360V T_J≤175℃ Tsc≤10μs	-	40	-	A

电特性 ELECTRICAL CHARACTERISTICS

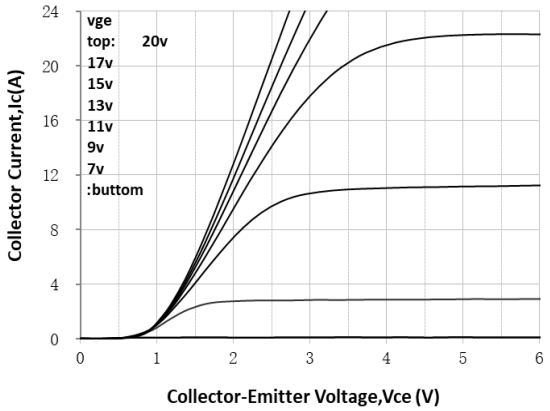
开关特性 Switching Characteristics						
项　　目 Parameter	符　号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
开启延迟时间 Turn-on delay time	t_{d}(on)	V_{CC}=400V, I_C=5A, R_G=60Ω V_{GE}=15 V T_J=25℃	-	13.1	-	ns
上升时间 Turn-on rise time	t_r		-	9.2	-	ns
关断延迟时间 Turn-off delay time	t_{d}(off)		-	42	-	ns
下降时间 Turn-off fall time	t_f		-	107.6	-	ns
开通损耗 Turn-on energy	Eon		-	91	-	μJ
关断损耗 Turn-off energy	Eoff		-	55	-	μJ
总开关损耗 Total switching energy	Etot		-	146	-	μJ
开启延迟时间 Turn-on delay time	t_{d}(on)	V_{CC}=400V, I_C=6A, R_G=60Ω V_{GE}=15 V T_J=25℃	-	13.4	-	ns
上升时间 Turn-on rise time	t_r		-	10.8	-	ns
关断延迟时间 Turn-off delay time	t_{d}(off)		-	41.2	-	ns
下降时间 Turn-off fall time	t_f		-	101.1	-	ns
开通损耗 Turn-on energy	Eon		-	130	-	μJ
关断损耗 Turn-off energy	Eoff		-	67	-	μJ
总开关损耗 Total switching energy	Etot		-	197	-	μJ
开启延迟时间 Turn-on delay time	td(on)	V_{CC}=400V, I_C=5A, R_G=60Ω V_{GE}=15 V T_J=175℃	-	11.3	-	ns
上升时间 Turn-on rise time	tr		-	10.7	-	ns
关断延迟时间 Turn-off delay time	td(off)		-	47.8	-	ns
下降时间 Turn-off fall time	tf		-	208	-	ns
开通损耗 Turn-on energy	Eon		-	117	-	μJ
关断损耗 Turn-off energy	Eoff		-	123	-	μJ
总开关损耗 Total switching energy	Etot		-	240	-	μJ
开启延迟时间 Turn-on delay time	td(on)	V_{CC}=400V, I_C=6A, R_G=60Ω V_{GE}=15 V T_J=175℃	-	11.8	-	ns
上升时间 Turn-on rise time	tr		-	11.9	-	ns
关断延迟时间 Turn-off delay time	td(off)		-	46.3	-	ns
下降时间 Turn-off fall time	tf		-	198.2	-	ns
开通损耗 Turn-on energy	Eon		-	141	-	μJ
关断损耗 Turn-off energy	Eoff		-	141	-	μJ
总开关损耗 Total switching energy	Etot		-	282	-	μJ
反并联二极管特性及最大额定值　Anti-Parallel Diode Characteristics and Maximum Ratings						
正向压降 Diode forward voltage	V_F	V_{GE}=0V, I_F=5A, T_J=25℃	-	1.65	2.2	V
		V_{GE}=0V, I_F=5A, T_J=175℃	-	1.5	-	V
反向恢复时间 Diode reverse recovery time	t_{rr}	V_{GE}=0V, VR=400V I_F=6A dI_F/dt=200A/μs T_J=25℃	-	139	-	ns
反向恢复电荷 Diode reverse recovery charge	Qrr		-	157	-	nC

反向恢复电流 Diode reverse recovery current	Irrm		-	2.6	-	A
反向恢复时间 Diode reverse recovery time	t_{rr}	V_{GE}=0V, VR=400V I_F=6A dI_F/dt=200A/μs T_J=175℃	-	187	-	ns
反向恢复电荷 Diode reverse recovery charge	Qrr		-	352	-	nC
反向恢复电流 Diode reverse recovery current	I_{rrm}		-	4.1	-	A

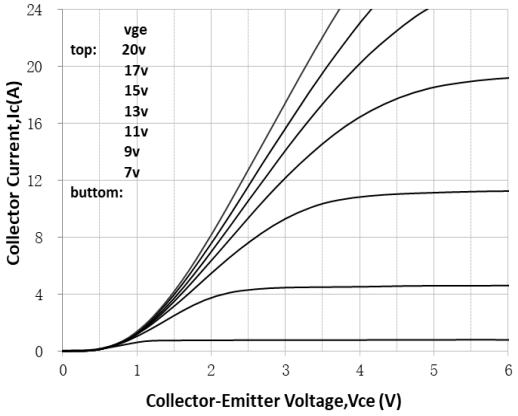
项　　目 Parameter	符　号 Symbol	最大值 MAX DPAK	单 位 Unit
结到管壳的热阻-IGBT Thermal resistance, junction to case	$R_{th(j-c)}$	2.2	℃/W
结到环境的热阻 Thermal resistance, junction to ambient	$R_{th(j-A)}$	110	℃/W

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

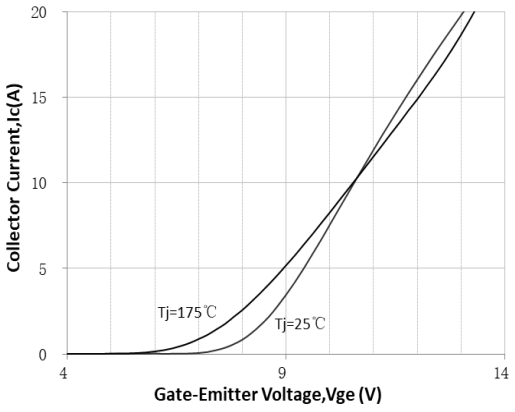
Output Characteristics T_J=25℃



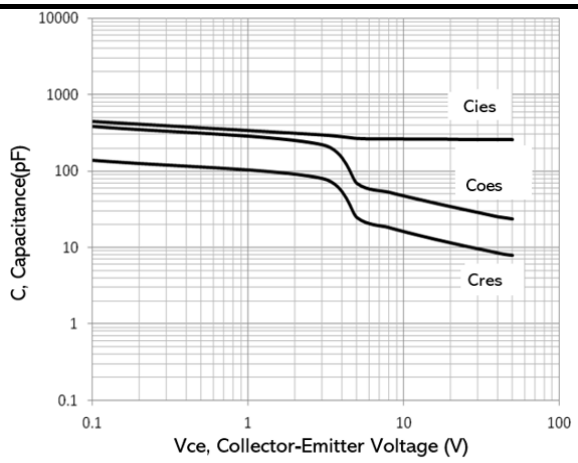
Output Characteristics T_J=175℃



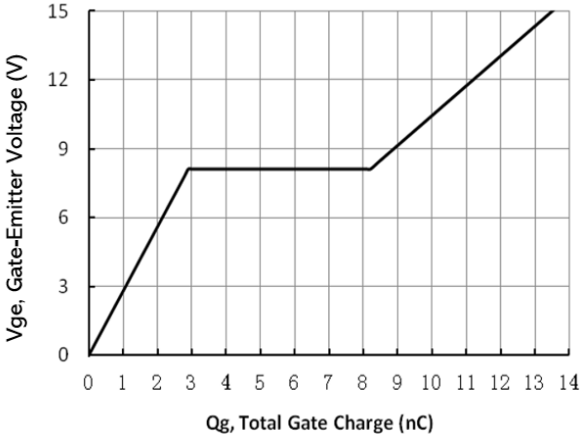
Typical Transfer Characteristics



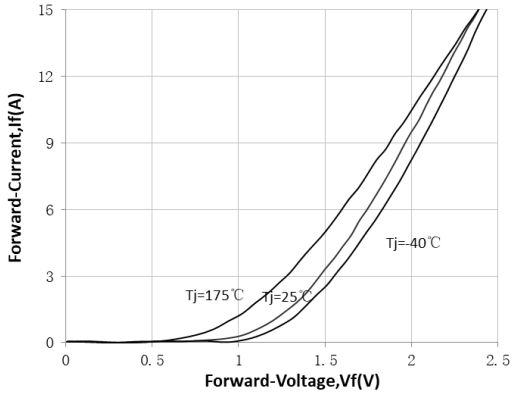
Capacitance Characteristics



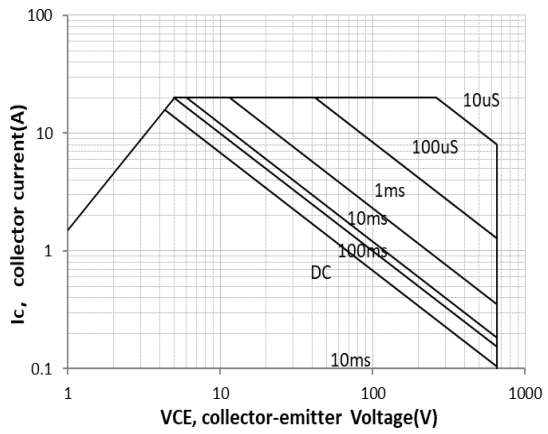
Gate Charge Characteristics
Vce=480V



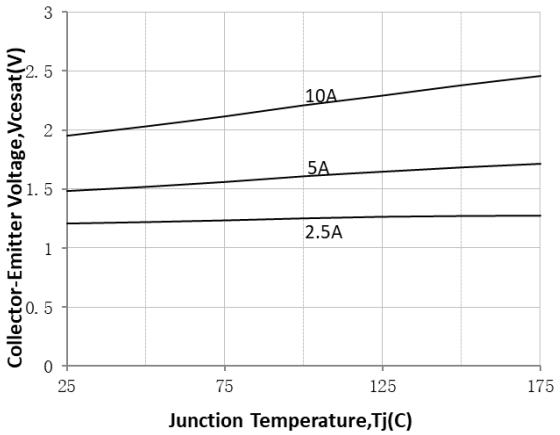
Diode Characteristic



SOA Characteristics For DPAK

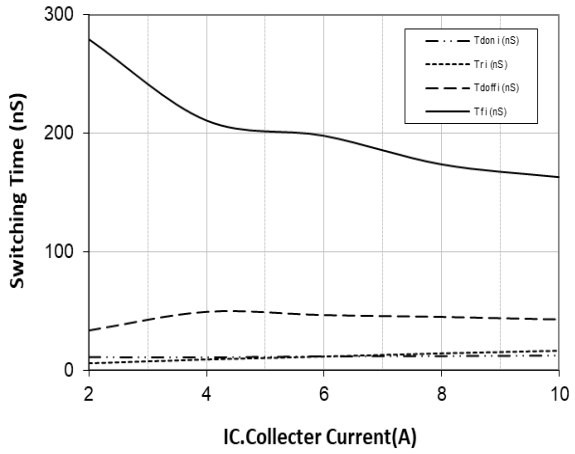


Vcesat vs T_J



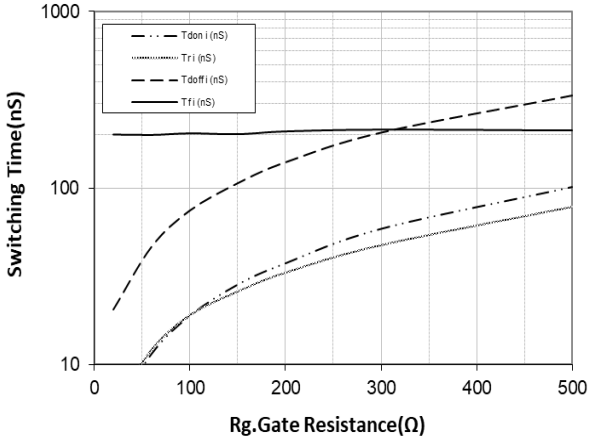
Switching Time vs Ic

T_J=175℃, Vge=15V, Vce=400V, Rg=60Ω



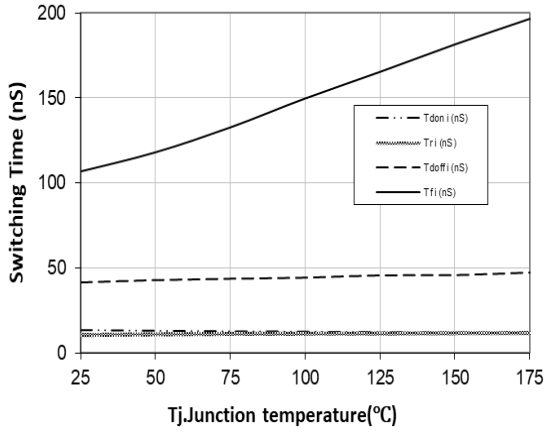
Switching Time vs Rg

T_J=175℃, Vge=15V, Vce=400V, Ic=6A



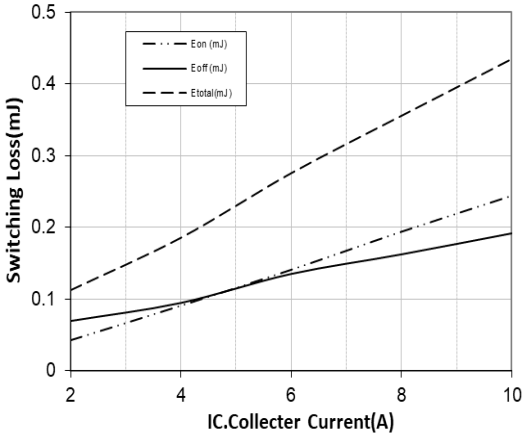
Switching Time vs T_J

Vge=15V, Vce=400V, Rg=60Ω, Ic=6A

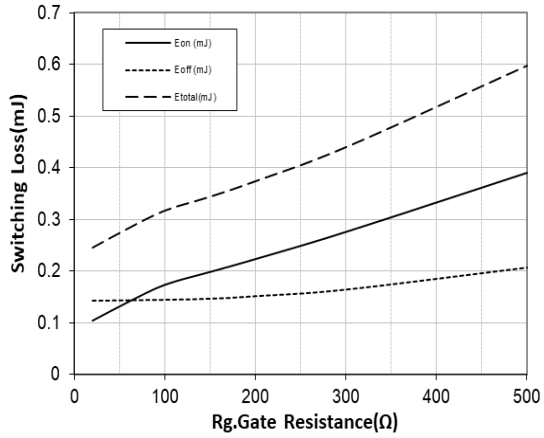


Switching Loss vs Ic

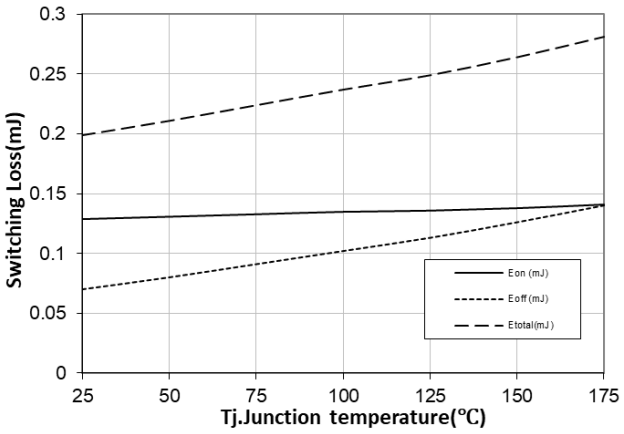
T_J=175℃, Vge=15V, Vce=400V, Rg=60Ω



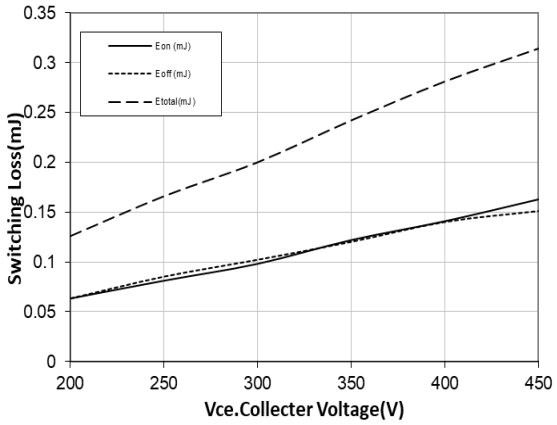
Switching Loss vs Rg
T_J=175℃, Vge=15V, Vce=400V, Ic=6A



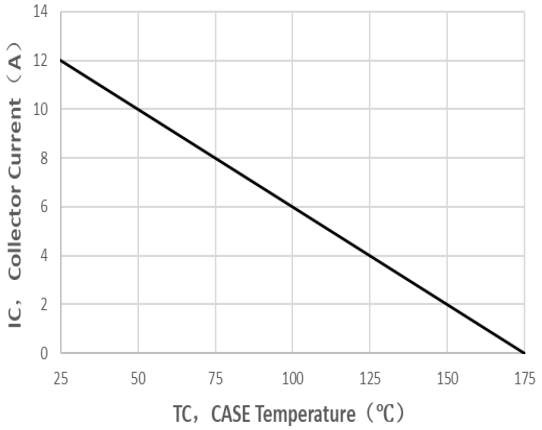
Switching Loss vs T_J
Vge=15V, Vce=400V, Ic=6A, Rg=60Ω



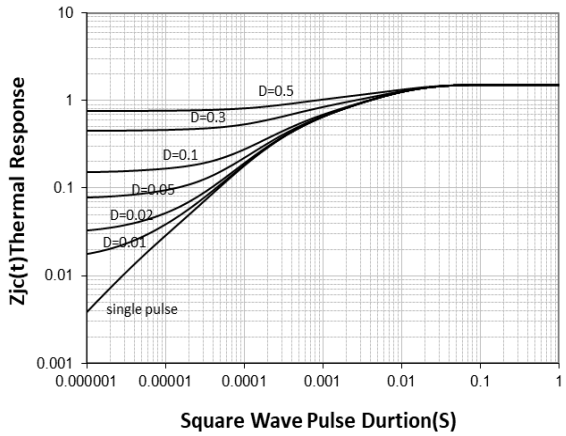
Switching Loss vs Vce
T_J=175℃, Vge=15V, Ic=6A, Rg=60Ω



Ic vs. Tc



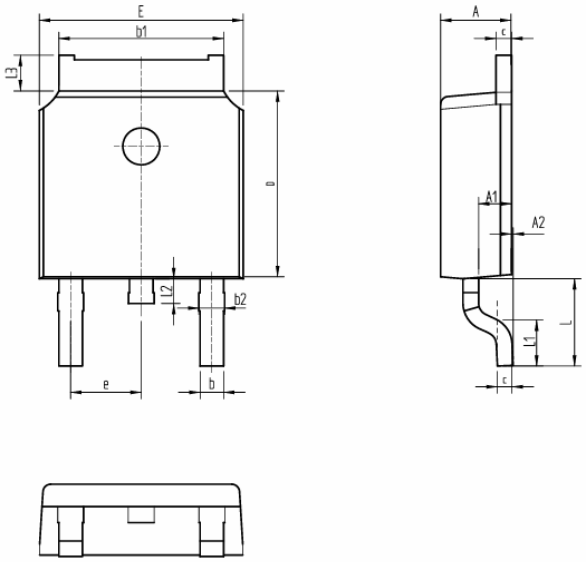
Normalized Maximum Transient Thermal Impedance for DPAK



外形尺寸 PACKAGE MECHANICAL DATA

DPAK

单位 Unit：mm



SYMBOL	mm	
	MIN	MAX
A	2.16	2.41
A1	0.97	1.17
A2	0.00	0.15
b	0.63	0.93
b1	5.13	5.53
b2	0.66	0.96
c	0.40	0.60
D	5.80	6.40
E	6.30	6.90
e	2.286BSC	
L	2.50	3.30
L1	1.20	1.80
L2	0.60	1.00
L3	0.85	1.30

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3. Please do not exceed the absolute maximum ratings of the device when circuit designing.
4. Jilin Sino-microelectronics co., Ltd reserves the right to make changes in this. specification sheet and is subject to change without prior notice.

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